5 June 2012 Central Montana Tornado Event

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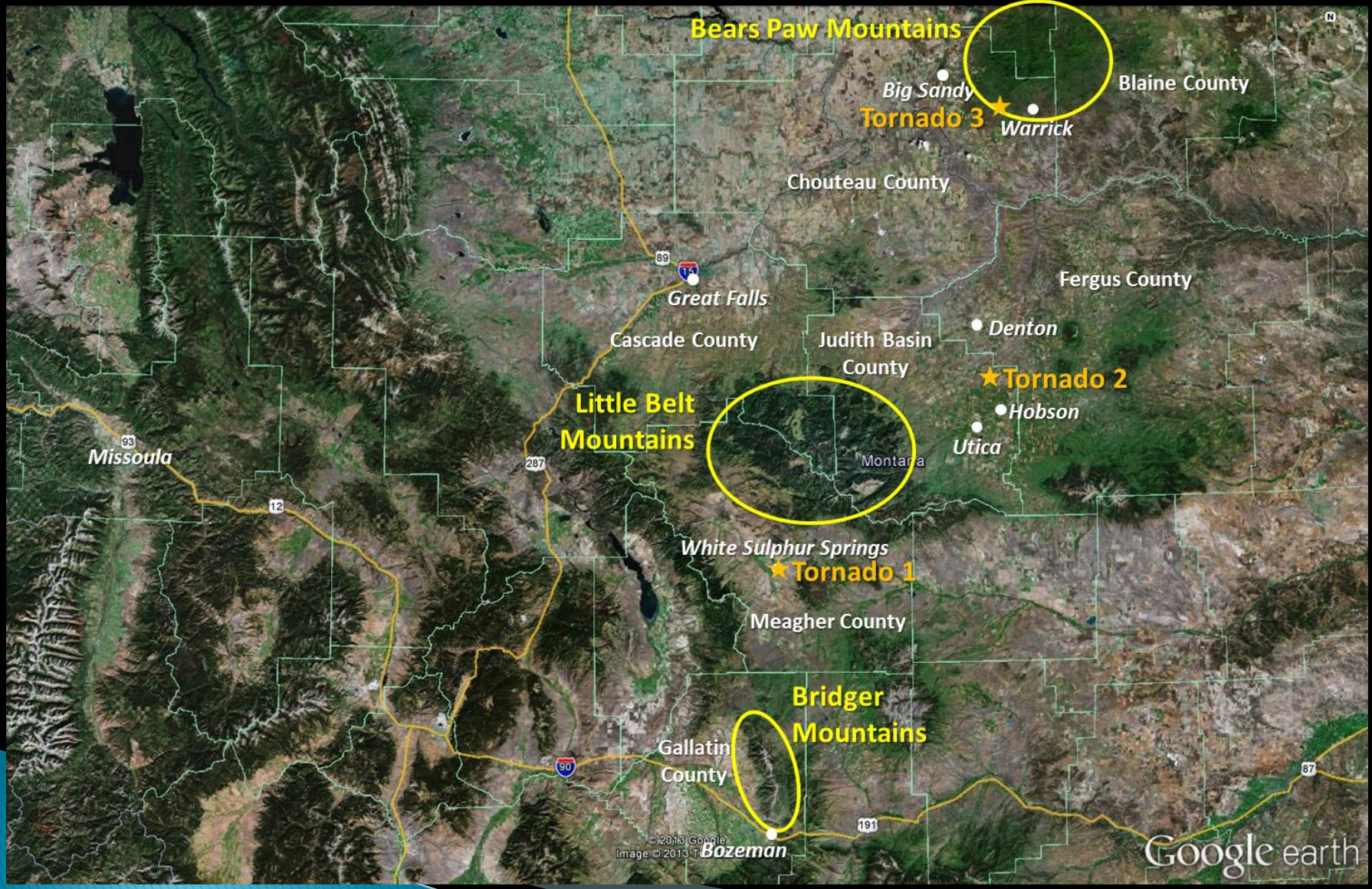
Introduction



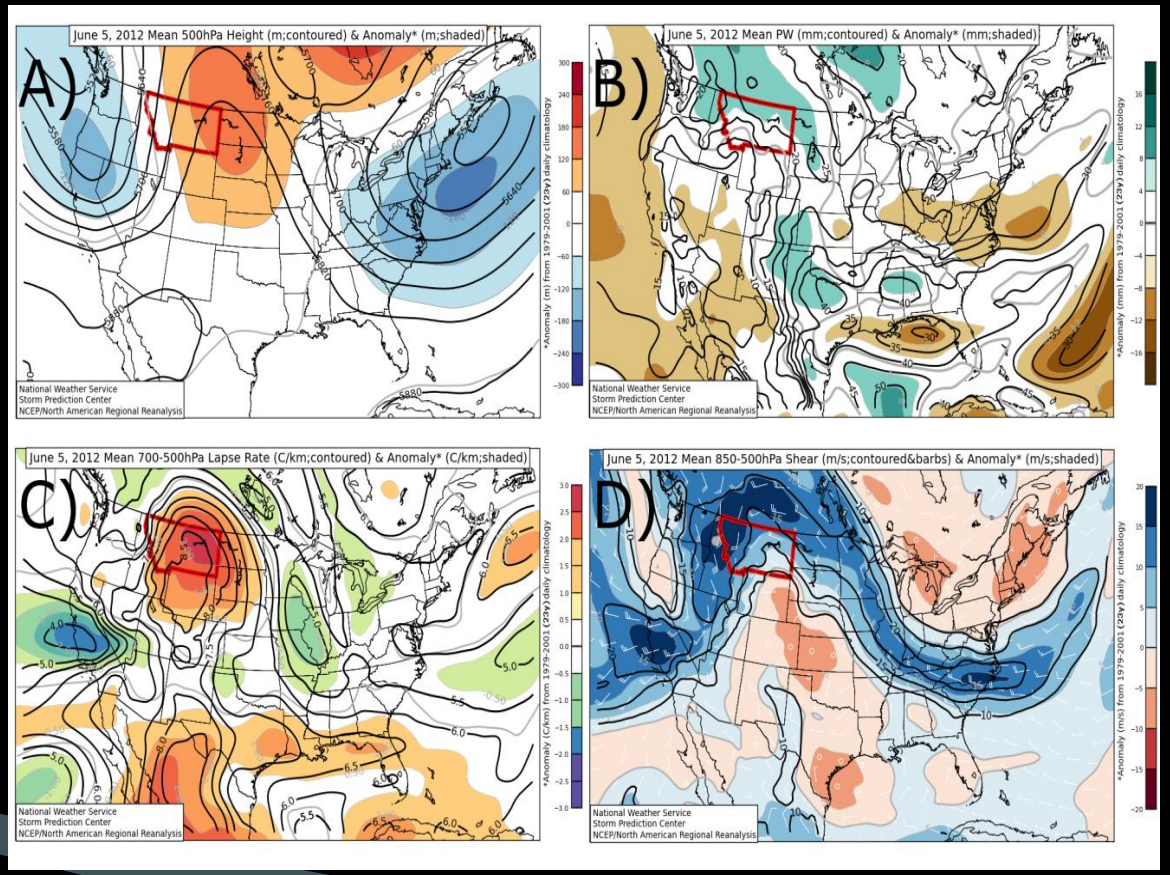
Introduction

- Three confirmed tornadoes from two supercell thunderstorms
- Minor structural and agricultural damage
- No injuries/fatalities

	White Sulphur Springs Tornado	Rural Hobson / Moccasin Tornado	Rural Big Sandy Tornado
County Name	Meagher	Judith Basin	Chouteau
Rating	EF1	EF0	EF0
Path length (km)	~3.2	~4.8	~1.6
Mean Width (km)	~0.27	~0.36	~0.07

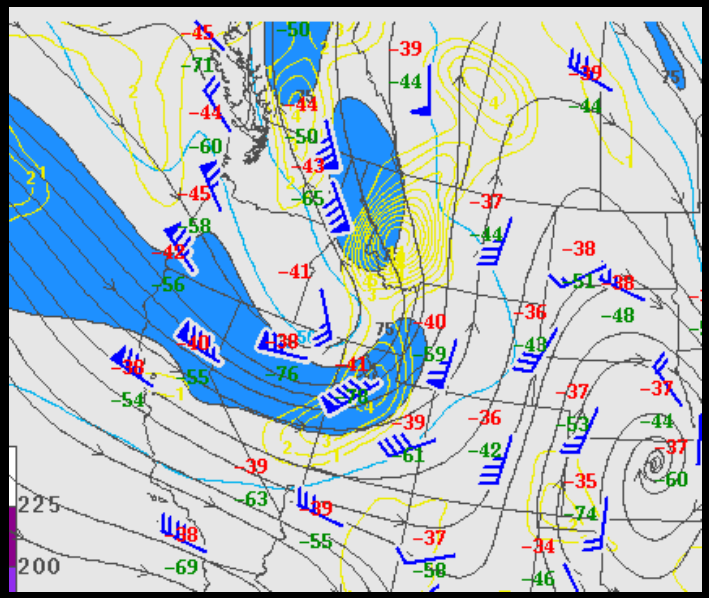
Climatology

- 1 tornado per 25,900 square km in Montana on average (1991-2010 climatology) (Credit: Carbin, 2013)
- Anomalous mid-level lapse rate and shear
- Strength and amplitude of the 500-hPa downstream ridge main difference between this event and best-matching analogs

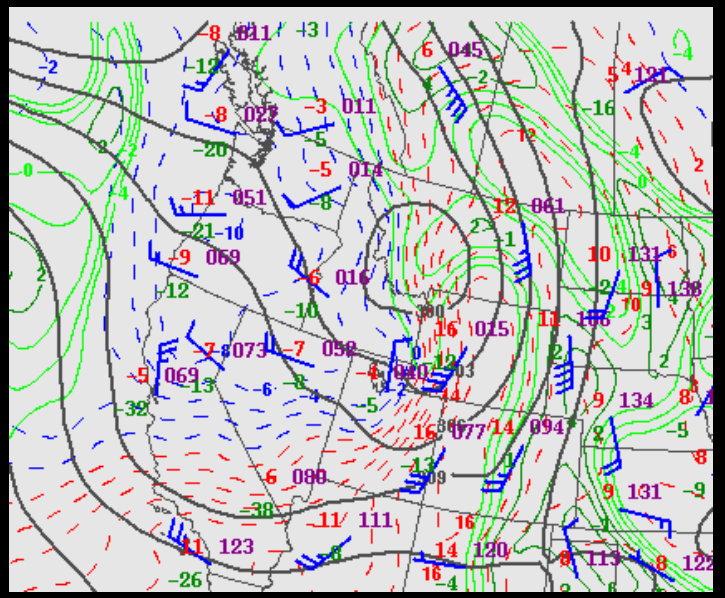


Synoptic Setup

- Strong upper-level divergence
- Negatively-tilted shortwave trough
- Ridge-axis over the central and northern Plains



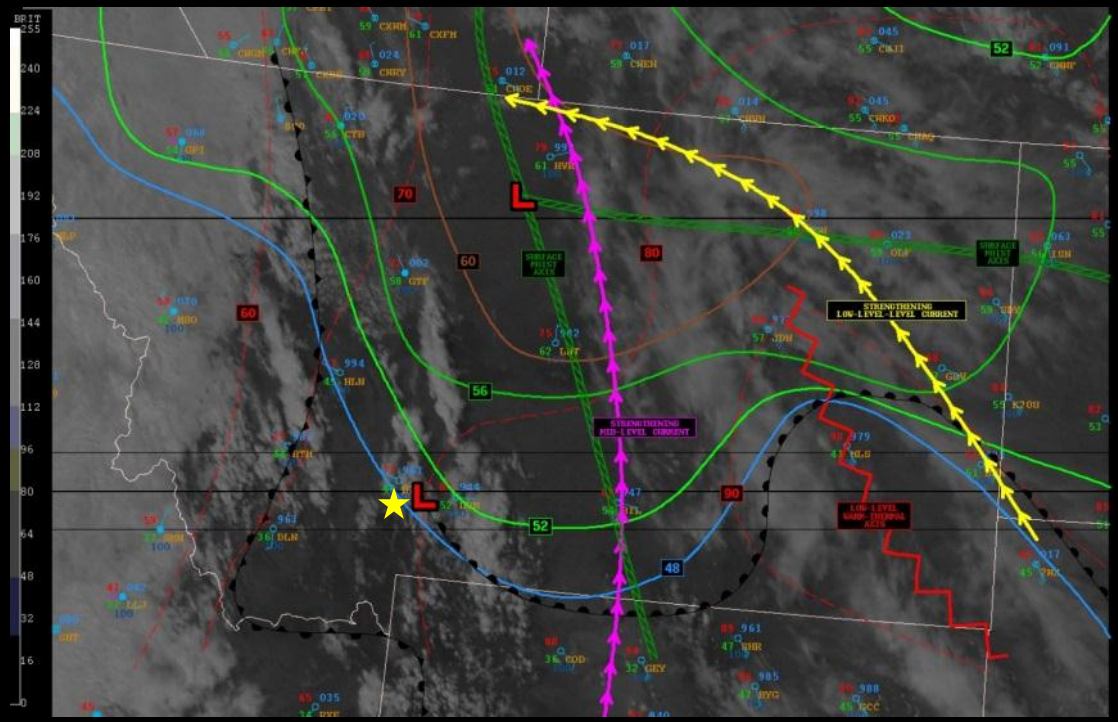
300mb



700mb

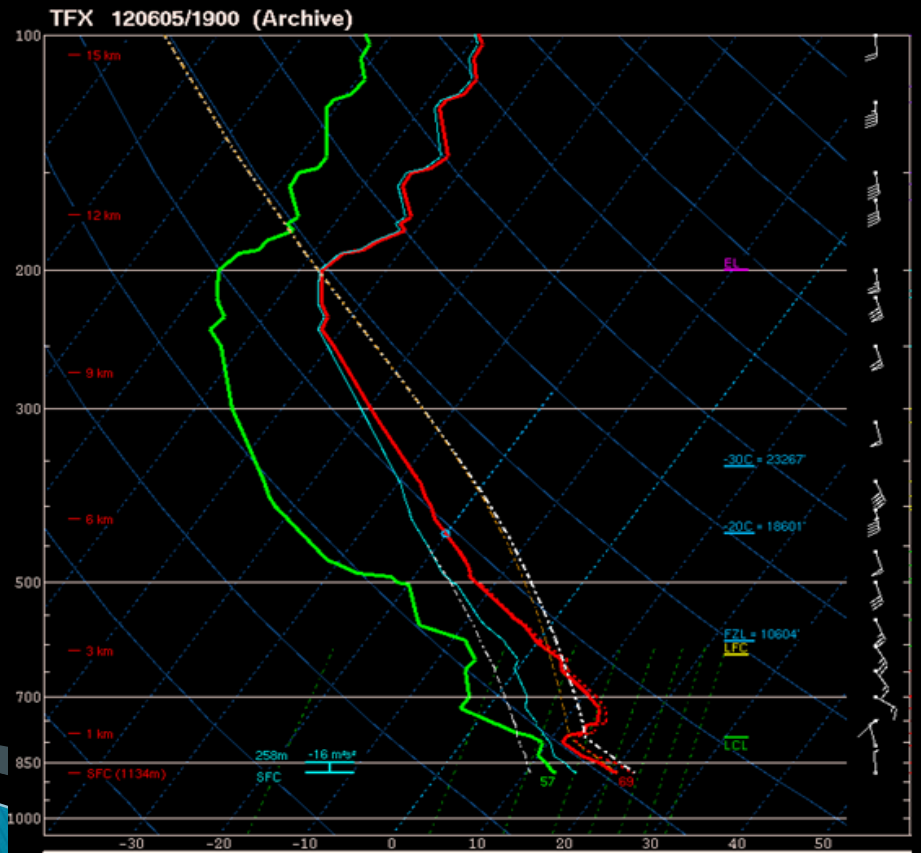
Mesoscale Setup

- Dew points in the upper 50s and lower 60s
- Anomalously high PWAT values around 1.15 inches
- Convective initiation near Bozeman (yellow star) from orographic lift



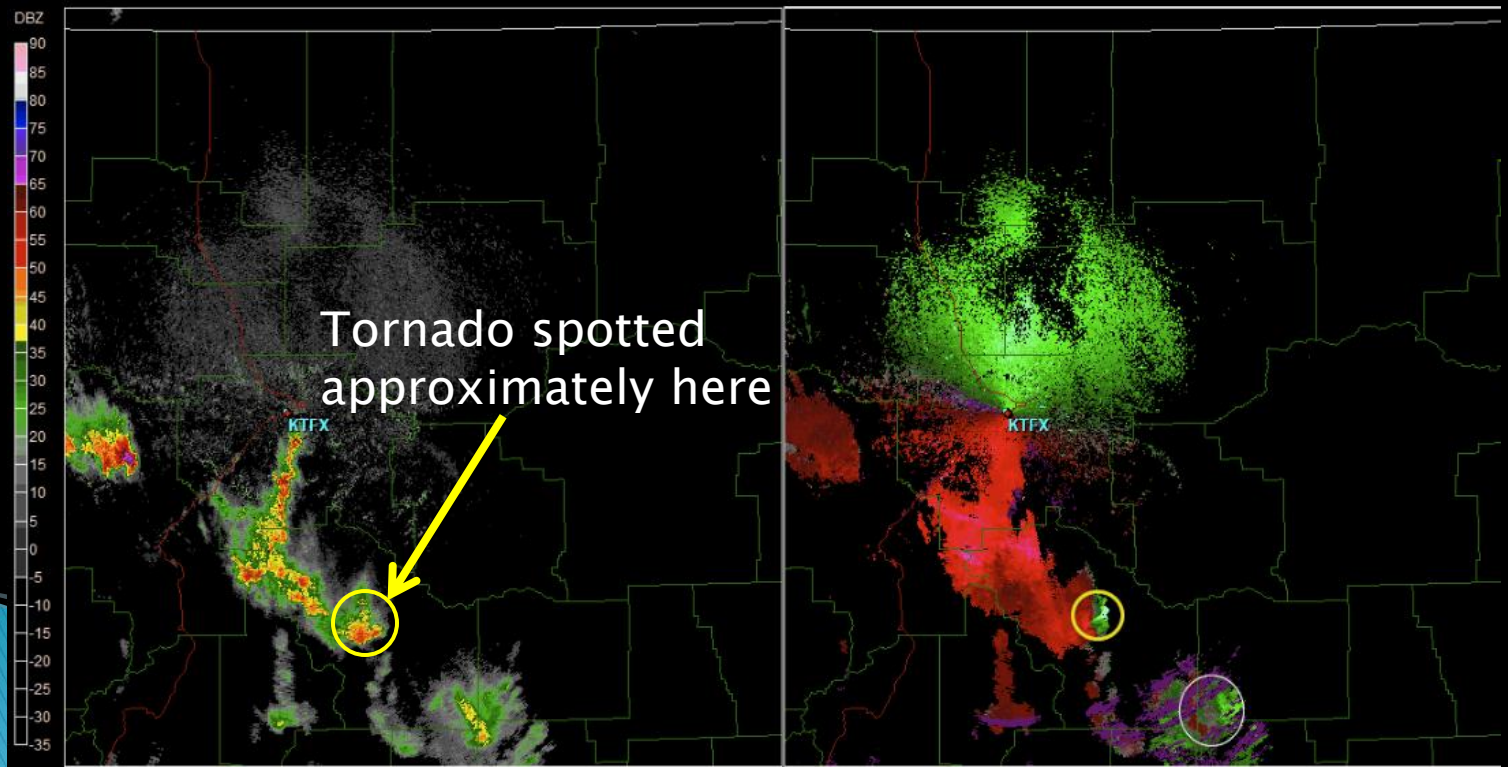
Mesoscale Setup

- Steep Lapse Rates: 8 to 9°C km^{-1}
- 0-1km and 0-3km Storm-Relative Helicity: 200-300 m^2 s^{-2}
- Mid-Layer CAPE: ~2000 Jkg^{-1}
- Effective Bulk Shear: 50 kts



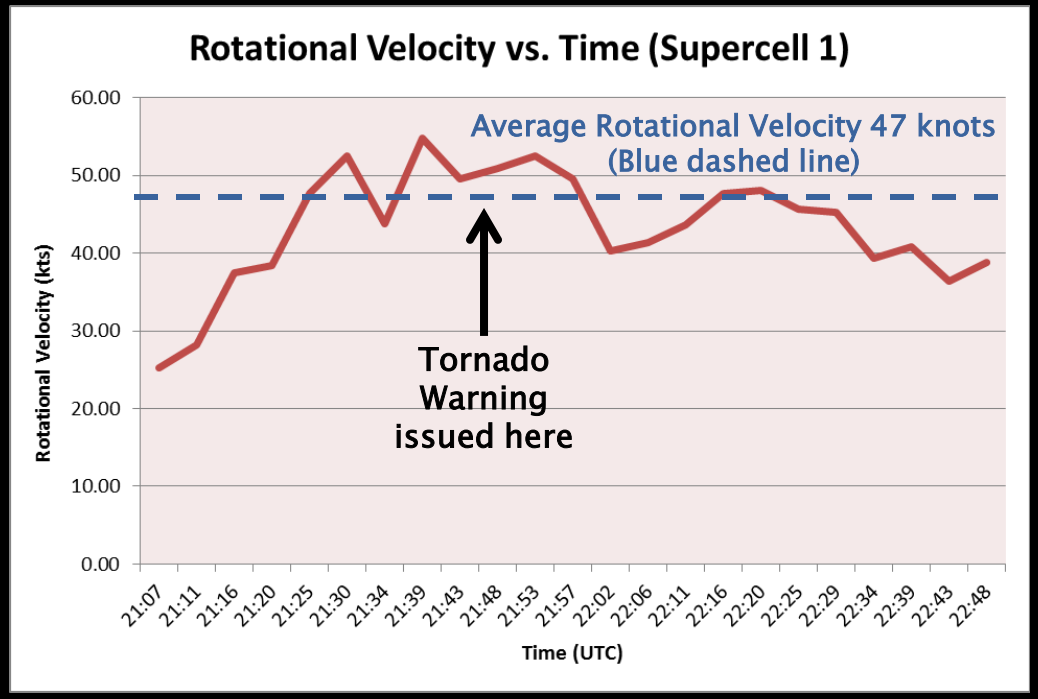
Radar Evolution

- First supercell developed in southwest Montana around 2000 UTC
- Tornado Warning issued at 2149 UTC and included White Sulphur Springs
- Maximum Rotational Velocity: 51 knots



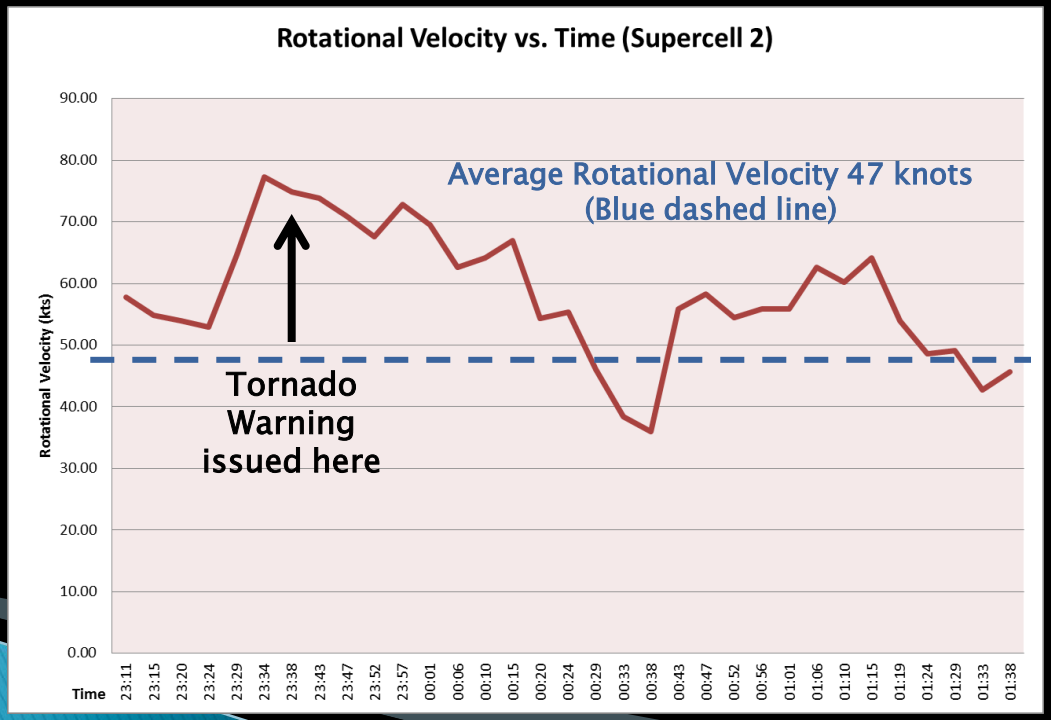
Radar Evolution

- Between 2009 and 2012, 15 out of 21 Montana tornado cases that had a strong mesocyclone present indicated an average rotational velocity of 47 knots (Courtesy: Bryan Smith, SPC)



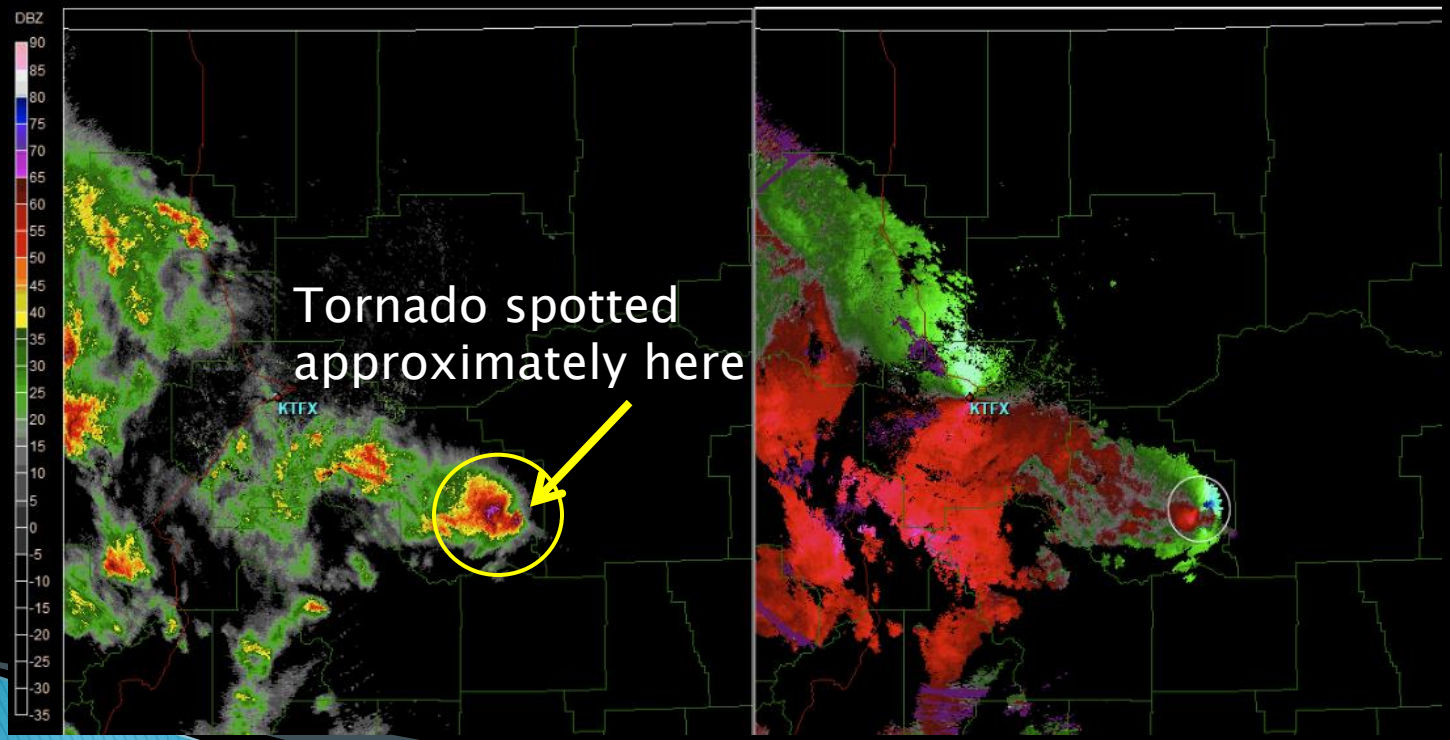
Radar Evolution

- Second supercell developed in central Montana around 2230 UTC
- Tornado Warning issued at 2340 UTC and included Hobson and Utica and continued through 0254 UTC
- Maximum Rotational Velocity: 77 knots

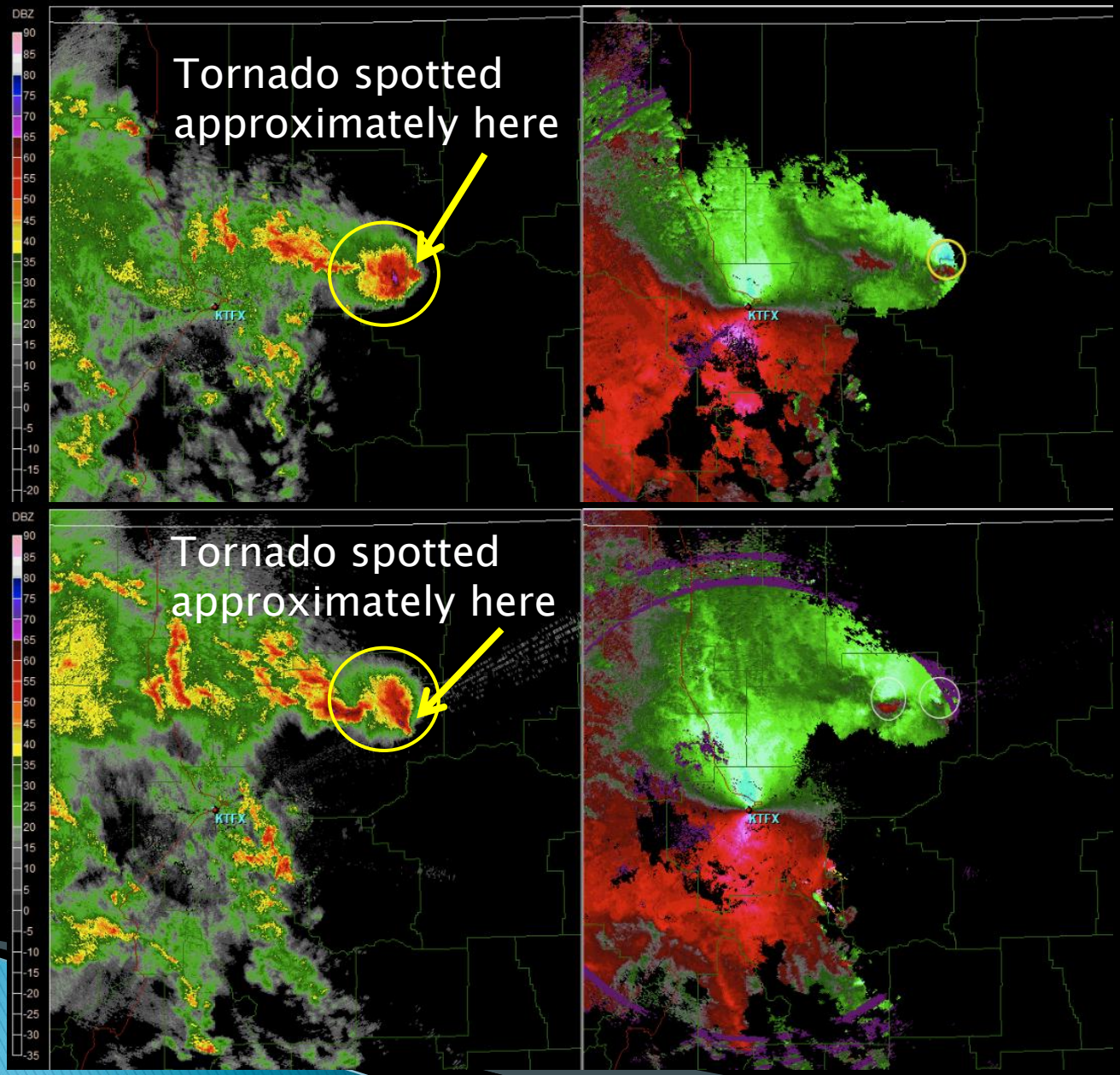


Radar Evolution

- Two gate-to-gate shear maxima noted in SRM data throughout life cycle of this supercell
- NWS Storm Survey indicated straight-line wind damage in Hobson/Utica

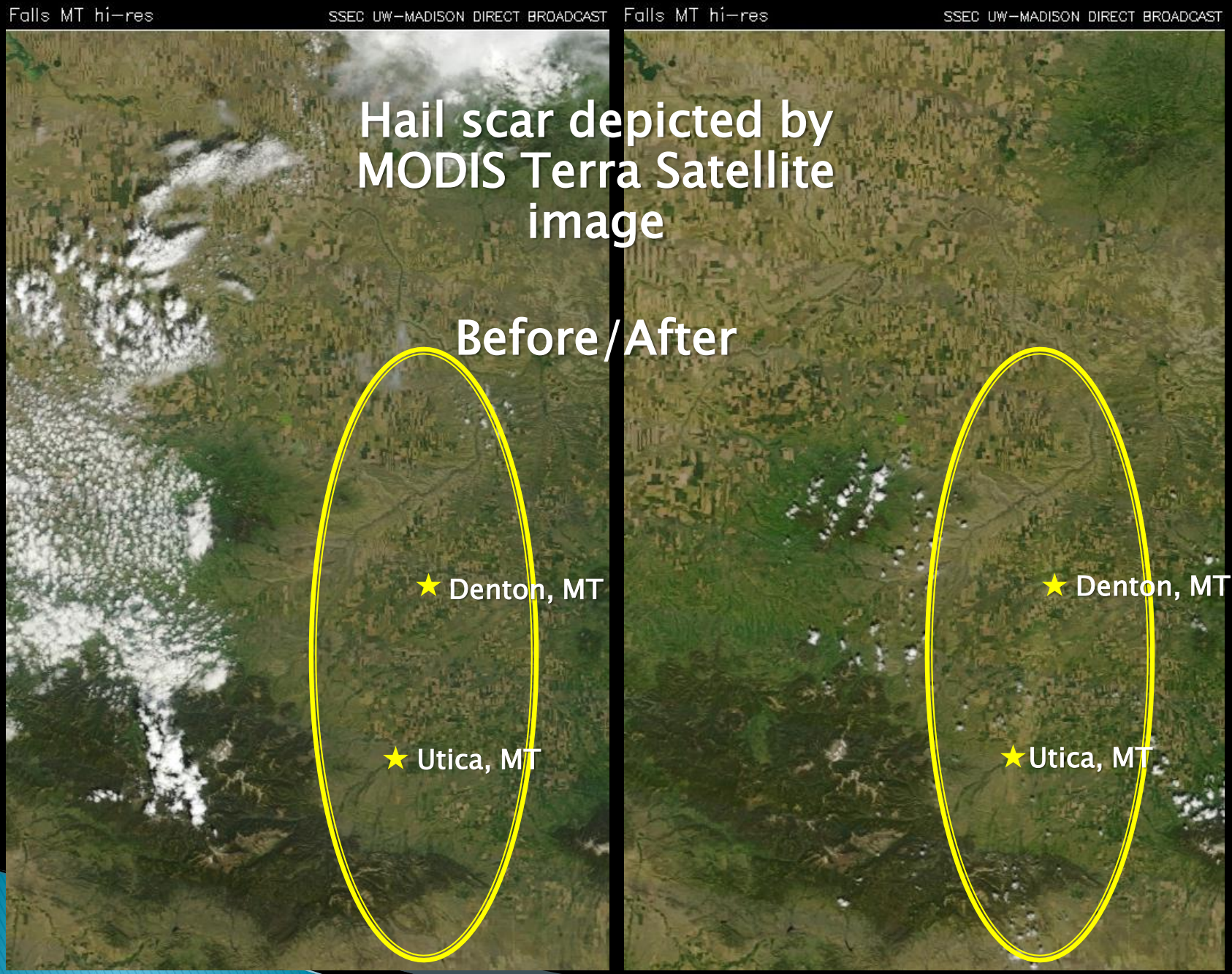


Radar Evolution



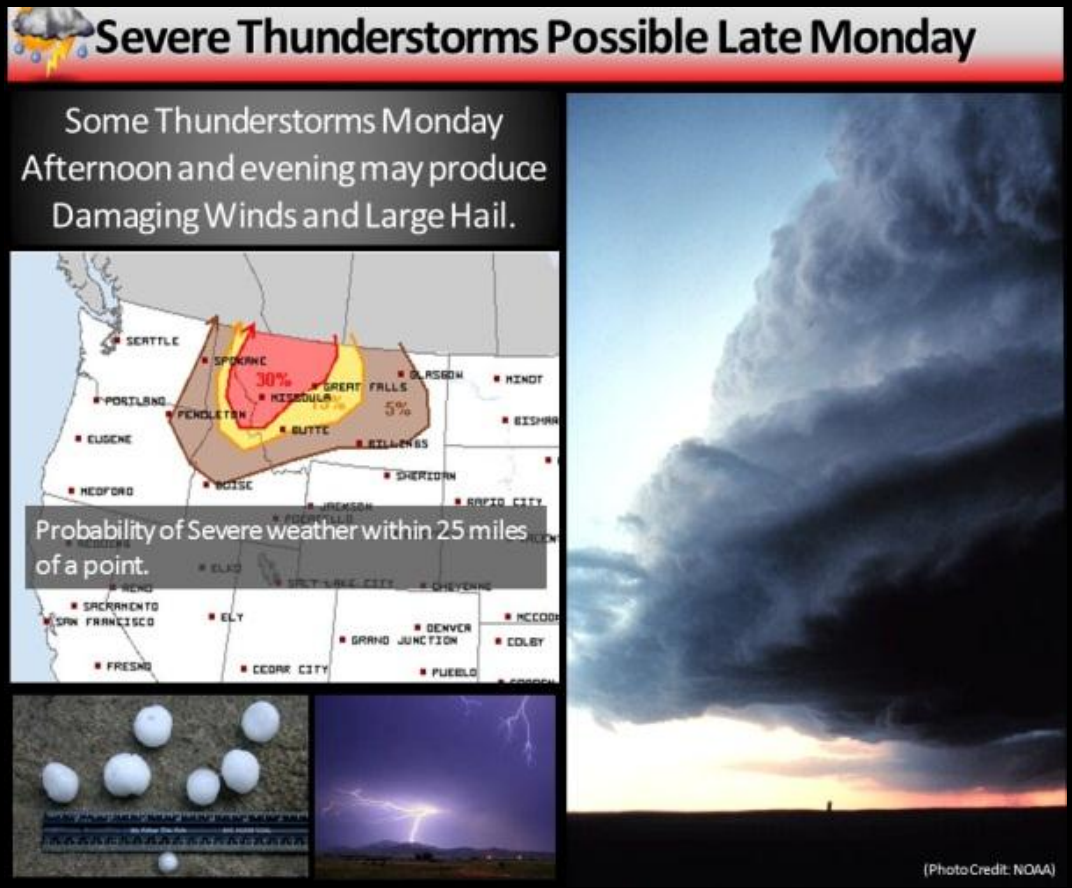
MODIS Terra 1825Z June 5, 2012

MODIS Terra 1825Z June 7, 2012 – Hail path central Montana



Impact-Based Decision Support Services

- Email notification initially sent to partners on May 31, 2012 with an update on June 3, 2012
- Weather graphic (shown right) created on June 3, 2012
- A weekly Montana weather briefing discussed the potential for severe weather including the threat for tornadoes



“Supercell 2” Tornadoes

- Storm chasers captured these two photos of the tornadoes from “supercell 2”
- NWS Great Falls received photos from local media and directly contacted the photographers/storm chasers for confirmation

NWS Great Falls Storm Survey

Thank you for listening!

Questions?